Figure 3.4

Geographic Zone

Loop Component	Frequency	Copper Aerial Cable	Copper Buried Cable	Copper Underground Cable	Fiber Buried Cable	Fiber Underground Cable	Poles	Conduit	Circuit Equipment	COE Frame
Premises Termination	100%	$XX.XX	$XX.XX							
Distribution Cable	100%	$XX.XX	$XX.XX	$XX.XX			$XX.XX	$XX.XX		
Feeder - Distribution Interface	YY%		$XX.XX							
Feeder Cable										
Copper	XX%	$XX.XX	$XX.XX	$XX.XX			$XX.XX	$XX.XX		
Fiber	YY%				$XX.XX	$XX.XX	$XX.XX	$XX.XX		
Feeder Stub	YY%		$XX.XX							
DLC System	YY%								$XX.XX	
MDF Stringer	100%									$XX.XX
		$XX.XX	$XX.XX	$XX.XX	$XX.XX	$XX.XX	$XX.XX	$XX.XX	$XX.XX	$XX.XX

Note: XX% + YY% = 100%

4.0 Switch Port Cost Studies

4.1 Switch Port Investment Models

The investment model used to develop the recurring portion of an analog line termination at the digital switch is the Switching Information Cost Analysis Tool (SICAT 2.0). SICAT is a cost tool that develops unit investments for switching components as determined by SBC's most current vendor contracts. SICAT produces the investment per trunk port channel. Refer to the model documentation for further information regarding the SICAT model.

4.2 Port Cost Elements

The port costs are derived from the SICAT model based on the most recent switch vendor contracts. After the port investment is derived from the model, capital costs and operating expense factors are applied to develop recurring monthly costs. See sections below for a description of the factors.

4.3 Recurring Cost Elements

- *Monthly Analog Line Termination Cost, Per Line.* This recurring cost element represents the monthly cost associated with the termination of an analog line at a digital switch.

- *Monthly Main Distribution Frame Cost, Per Line*_ This recurring cost element represents the monthly cost associated with the use of one half of the Main Distribution Frame (MDF) equipment by an analog line.

- *Monthly Terminal Block Connector Cost, Per Line* This recurring cost element represents the monthly cost associated with the Terminal Block Connector equipment at the central office MDF.

5.0 Capital Costs

5.1 Definition of Capital Costs

Capital costs include *depreciation expense*, the *cost of money* and *income taxes*.

- *Depreciation* is the annual expense of recovering the original construction cost of telephone plant, less any net salvage, over the service life of the plant. Depreciation is computed for each plant account based upon the prospective lives and expected net salvages.

- *Cost of money* is the annual return required on investor supplied capital used to construct telephone plant. The return requirement includes the prospective costs of debt and equity, weighted by the proportion of debt and equity anticipated in Southwestern Bell's forward-looking capital structure.

- *Income taxes* represent the amount of income taxes which would be owed on taxable income from revenues sufficient to cover the cost of equity after taxes.

When revenues from offering a network element are sufficient to recover its operating expenses and capital costs, revenues are said to recover all costs, including the costs of capital recovery and the return required on investor capital.

5.2 Capital Cost Calculation

Figure 6.1 provides a simplified example of capital cost calculations for a single item of telephone plant with a five year service life. The results of the calculations shown on the last three lines are factors which are multiplied times the original cost of plant or gross investment to compute capital costs.

- *Plant investment and net salvage.* The original cost of telephone plant or *plant investment* is incurred at the beginning of the plant's *service life*. At the end of the service life, the Company may realize some value, *gross salvage*, in disposing of the plant. This amount is reduced by any *cost of removal*, yielding a *net salvage* value. Service lives and net salvages expressed as a percentage of plant investment are estimated annually for each plant account based on the forward-looking lives and salvages expected for telephone equipment. They vary somewhat among the states in which Southwestern Bell operates.

- *Depreciation rate, depreciation expense, depreciation reserve and net investment.* The *depreciation rate* equals 100% of plant investment less the percentage net salvage, divided by the service life. *Depreciation expense* is the product of the depreciation rate and plant investment. Depreciation rates vary among plant accounts.

  Over the life of the plant, depreciation is accrued in a reserve reflecting the gradual recovery of the initial capital investment. The difference between plant investment and the *depreciation reserve* equals the *net investment*. A annual return must be earned on the remaining investor capital in the plant.

- *Costs of debt and equity, debt ratio and the cost of money.* Funds for telephone plant construction come from depreciation accruals or cash from current operations used to recover prior plant investment, capital from the issuance of bonds and stock, and retained earnings. (As described below, deferred income taxes also are used to fund capital investment.)

  Debt capital has an interest payment obligation referred to as the *cost of debt*, and equity capital from stocks and retained earnings has a return requirement or *cost of equity*. The mix of debt and equity capital, measured by the *debt ratio* or ratio of debt to debt and equity capital, determines the composite *cost of money*. Southwestern Bell estimates its forward-looking costs of debt and equity and debt ratio to determine the cost of money used in the network element cost studies.

  The annual cost of money equals the cost of money percentage applied to the net investment. As the net investment declines, the cost of money or return requirement also declines.

- *Income tax rate, taxable income required and income tax expense.* The *income tax rate* is the effective federal and state income tax rate. In order to realize income after taxes sufficient to cover the cost of equity requires a level of *taxable income* equal to the cost of equity divided by (1 - income tax rate).[3] The *income tax expense* is the income tax rate times the taxable income requirement.

The capital costs vary each year as net investment in telephone plant declines. In order to "levelize" the series of capital costs, they are brought to the present using *present worth factors* computed at the cost of money, and then spread back over the service life using an *annuity factor*.[4] After these steps are completed, the levelized capital costs are divided by the original plant cost to compute levelized capital cost factors. These factors are then used in ACES to compute capital costs for each type of plant.

Capital cost calculations actually are more complicated than those shown in Figure 8.1. Several additional factors are take into consideration. For example,

- *Effects of accelerated tax depreciation.* The use of accelerated tax depreciation and the normalization of deferred income taxes reduces investor-supplied capital in telephone plant. Recognizing accelerated tax depreciation lowers the cost of money and associated income taxes.

- *Multiple units of plant, survivor curves and method of depreciation.* Unlike the earlier example, telephone plant normally consists of multiple units of plant placed during a year, and these units usually have different survival patterns, with some retiring before others. The plant placed in a single year is subject to equal life group depreciation.

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[3] Since interest expense is tax deductible, there is no need to "gross up" the cost of debt to a pre-taxable income amount.

[4] Capital costs also can be computed over planning periods less than the service life by computing the present worth and annuity of capital costs for shorter periods of time.

These factors require modeling the timing of plant investment, retirements, annual depreciation and net investment.

SBC uses the CAPCS model to reflect these and other factors in computing capital costs. The variables described above are the key input variables to the CAPCS model.

Figure 6.1 - ***Illustrative.***

	Line	Factor	End of Year 0	1	2	3	4	5	Source
Plant Investment	1		$ 1,000						Investment Study
Gross Salvage	2							$ 200	Engineering
Cost of Removal	3							$ 100	Engineering
Net Salvage	4							$ 100	Ln. 2 - Ln. 3
Depreciation Rate	5	18.00%							(100% - NS%) / S.L.
Depreciation Expense	6			$ 180	$ 180	$ 180	$ 180	$ 180	Ln. 1 X Ln. 5
Depreciation Reserve	7		$ -	$ 180	$ 360	$ 540	$ 720	$ -	Cumulative Ln. 6
Net Investment	8		$ 1,000	$ 820	$ 640	$ 460	$ 280	$ -	Ln. 1 - Ln. 7
Cost of Debt	9	8.0%							Finance
Cost of Equity	10	12.0%							Finance
Debt Ratio	11	50.0%							Finance
Cost of Money	12	10.0%							Ln. 9 X Ln. 11 + (1 - Ln. 11)X Ln. 10
Cost of Money	13			$ 100	$ 82	$ 64	$ 46	$ 28	Ln. 8 X Ln. 12
Income Tax Rate	14	40.0%							Finance
Fraction Equity of COM	15	60.0%							(Ln. 12 - (Ln. 9 X Ln. 11)) / Ln. 12
Cost of Equity	16			$ 60	$ 49	$ 38	$ 28	$ 17	Ln. 13 X Ln. 15
Taxable Income Required	17			$ 100	$ 82	$ 64	$ 46	$ 28	Ln. 16 / (1 - Ln. 14)
Income Tax Expense	18			$ 40	$ 33	$ 26	$ 18	$ 11	Ln. 14 X Ln. 17
Present Worth Factors	19			0.909	0.826	0.751	0.683	0.621	1 / (1 + Ln. 12) ^ Year
Present Worths									
Depreciation	20			$ 164	$ 149	$ 135	$ 123	$ 112	Ln. 6 X Ln. 19
Cost of Money	21			$ 91	$ 68	$ 48	$ 31	$ 17	Ln. 13 X Ln. 19
Income Taxes	22			$ 36	$ 27	$ 19	$ 13	$ 7	Ln. 18 X Ln. 19
Sum of Present Worths									
Depreciation	23	$ 682							Sum of Ln. 20
Cost of Money	24	$ 256							Sum of Ln. 21
Income Taxes	25	$ 102							Sum of Ln. 22
Annuity Factor	26	0.264							1 / Sum of Ln. 19
Levelized Capital Costs									
Depreciation	27	$ 180							Ln. 23 X Ln. 26
Cost of Money	28	$ 67							Ln. 24 X Ln. 26
Income Taxes	29	$ 27							Ln. 25 X Ln. 26
Capital Cost Factors									
Depreciation	30	18.0%							Ln. 27 / Ln. 1
Cost of Money	31	6.7%							Ln. 28 / Ln. 1
Income Taxes	32	2.7%							Ln. 29 / Ln. 1

NS% - Net Salvage %
S.L. - Service Life

6.0 Investment Loadings

6.1 Definition of Investment Loadings

In performing cost studies, much of the effort goes to computing the *primary plant construction costs*. These include material costs of major equipment components, vendor engineering and installation labor costs, and others. The studies also focus on the *primary plant accounts*, such as cable and wire facilities, central office switching and central office transmission. A significant portion of the investment necessary to provide network elements is attributable to other construction costs, such as sales taxes, telco engineering and labor, miscellaneous materials, power equipment and buildings. These construction costs typically are included in the cost study by using *investment loading factors*.

Investment loading factors represent the ratio of these additional costs to the primary plant construction costs, such as the ratio of power equipment cost for switching systems to the cost of the switching system itself. Another investment loading for buildings is the ratio of investment in network buildings to the total investment in switching, circuit and other equipment housed in the buildings. They are used to estimate the additional plant investment required to provide services.

6.2 Description

Seven investment loading factors are used in the forward-looking cost studies. The factors are based on special studies of financial and engineering records and vary by state. Each factor is briefly described below.

- *Ratio of material to total EF&I and sales tax factor.* These two factors are used to compute sales taxes on central office switching, central office transmission, operator systems and general purpose computers. The first factor is applied to vendor charges for plant, including vendor engineering and labor, to estimate the cost of materials on which sales taxes apply. The factors are based on a special study of actual vendor material purchases during the most recent three year period and sales taxes paid in the previous year.

- *Telco engineering and plant labor factors.* These factors are used to compute the additional investment required for Southwestern Bell's engineering and labor in constructing central office switching, central office transmission and general purpose computer plant. The factors are based on special studies for the most recent three year period.

- *Sundry & miscellaneous factor.* This factor accounts for interest during construction, contracted labor and other miscellaneous costs in placing central office switching, central office transmission and general purpose computers. As with the previous factors, this factor is based on a study of financial records during a recent three year period.

- *Power equipment factor.* The power equipment factor is used to compute the costs of electrical equipment, such as generators, batteries, etc., needed to operate central office switching, central office transmission, general purpose computers and operator systems.

It is based on an analysis of power equipment and costs in the Separations regulatory accounting process.

- *Building factor.* A building factor is used to calculate the forward-looking investment in building space needed for central office switching, transmission and operator systems equipment. The factor is based on the ratio of the current cost of network buildings to the current cost of switching, circuit and operator systems.

7.0 Operating Expense Factors

7.1 Definition of Operating Expenses

Operating expenses are the *recurring* and *non-recurring* plant specific and plant non-specific costs attributable to a service or network component. Recurring expenses are computed using operating expense factors applied to network investments, although recurring expenses may be computed based on special studies of recurring work activities and associated costs.

7.2 Description of Operating Expense Factors

There are *four* operating expense factors used in cost studies.

- *Maintenance factor.* The maintenance factor includes *plant specific* expenses for a type of plant (expenses of maintaining, repairing and rearranging telephone plant in service), power expense, and testing expense. Special studies are performed to identify the portions of power and testing expenses attributable to switching, circuit, cable and wire, and other types of plant. Maintenance factors vary by plant account recognizing, for example, that aerial and underground cable have different maintenance requirements and costs.

  The maintenance factors are computed as the ratio of prior year maintenance expenses to average book investment, *adjusted to a current cost basis.* Current cost to book cost ratios are used to express plant investments in terms of current costs. Maintenance factor studies are performed annually using information from SBC financial accounting systems.

- *Support asset expense factor.* This factor is used to compute network element *plant non-specific expenses*, such as network administration, plant operations administration and engineering expenses, and s*upport asset costs* attributable to the network element. There are separate expense factors for central office switching, central office transmission, cable and wire facilities, public telephone and other terminal equipment. The factor is based on the ratio of support asset expenses during the previous year to average plant investment, adjusted to a current cost basis.

- *Miscellaneous expense factor.* A single factor is applied to all plant types to compute miscellaneous expenses for property taxes, franchise taxes and other operating taxes. The factor also is referred to as the *ad valorem tax factor.*

Attachment 2

SBC Loop Costing System

(SLCS)

Documentation

Version 1.0

Notice of Disclaimer

SBC reserves the right to revise this document for any reason, including but not limited to, conformity with standards promulgated by various agencies, utilization of advances in the state of the technical arts, or reflection of changes in the design of any equipment, techniques, or procedures described or referred to herein.

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SBC Loop Costing System

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SBC Loop Costing System

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1.0 Introduction

The SBC Loop Costing System (SLCS)[1] is a Microsoft Excel® based investment and cost development tool. This document is intended to familiarize the reader with the purpose of this costing system, a primer on telecommunication loops, the inputs and outputs of SLCS, and finally, a detailed description of the SLCS methodology. The numbers imbedded in the figures and calculations within this document are to help the reader better understand the flow of SLCS and are not based on any particular cost study and do not reflect real cost of a loop.

Section 1.0 of this document provides an introduction to the SBC Loop Costing System. The purpose and an overview are presented in Sections 1.1 and 1.2. Then, the costing methodology employed in SLCS is briefly covered in Section 1.3.

For those wanting a more detailed description of a loop and its associated costs, Section 2 describes the local telephone network, including a comprehensive description of the components of local loop plant, and the nature of loop costs. Section 3 reviews all the various input data needed for SLCS and then outlines the cost output information. Finally, Section 4 details the methodology that SLCS uses to calculate all the loop unit investments.

1.1 Purpose of SLCS

SLCS develops the forward-looking costs of a local loop in SBC's telecommunications networks. Local loops are used to provide a communications path from customer premises equipment to the public switched telephone network (for local or long distance calling) or to private networks. A local loop consists of SBC telephone plant from the customer's premises, through distribution and feeder cable facilities, to the main distribution frame in the serving central office. Loop costs are calculated for the following types of loops:

> *2-Wire 8dB Analog Loop.* This is a general purpose voice grade local loop consisting of a copper cable pair or an equivalent electronic communications channel from the customer premises to the serving central office or remote switching system[2]. The designation, 8dB analog loop, indicates that the loop is designed to have no more then an 8dB signal loss for analog waveform

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[1] Throughout this document, the SBC Costing System will be referred to as either SLCS or the loop costing system.

[2] Loops from the customer premises to the serving central office may be provided via electronic transmission systems, called digital loop carrier systems, and fiber cables. In this case, copper cable pairs from the customer premises are terminated on the carrier system at a remote terminal where digital communication channels are established over a common fiber cable facility to the serving central office. There the electronic channels are converted to analog signals and connected to the switching system located in the central office.

transmission from the customer premises to the central office. Loops of this type are used for basic voice telecommunications services.

4-Wire 8dB Analog Loop. This is a special purpose voice grade local loop consisting of two copper cable pairs or two equivalent communications channels. 4-wire loops typically are used for special services where improved signal transmission is required.

2-Wire xDSL Loop. 2-wire xDSL loops are similar to the 2-wire 8dB loops except that xDSL loops are all-copper conductor loops. In addition, equipment that interferes with digital transmission, such as load coils and bridge taps, is removed from 2 wire xDSL loops. These loops are used for Digital Subscriber Line (DSL) services, which provide high-speed access to Internet Service Providers. Average xDSL loops are typically longer then average 2-wire 8dB analog loops.

4-Wire xDSL Loop. 4-wire xDSL loops are the same as the 2-wire xDSL loops, except that two copper pairs are provided between the central office and the customer premises. Typically, 4-wire xDSL loops are also used for special services when improved signal transmission is required.

Basic Rate Interface (BRI) Loop. The BRI loop supports digital transmission of two 64 Kbps bearer ("B") channels and one 16 Kbps data ("D") channel upon a single twisted copper pair. Special plug-in circuit cards are required within any digital loop carrier equipment that may be utilized in providing the service. BRI loops are used for Basic Rate Integrated Digital Service Network (ISDN) service. They enable voice and data communications over a single local loop.

DS1 Loop. This loop provides a transmission channel capable of conveying digital signals of 1.544 megabits per second from the customer premises to the serving central office. The system also supports the 1.536 megabits per second Primary Rate ISDN (PRI) service. The plant required for a DS1 loop includes a 4-wire digital loop.

SLCS determines the plant investment required for each type of loop, and then computes monthly recurring capital costs and operating expenses associated with this plant investment.[3] Loop costs may be determined as average values representative of loops within a state, a jurisdiction, or a zone within a state.[4] Loop costs may also be calculated for more specific subsets of loops such as private line loops or special access local channels. The output from SLCS is used in cost studies for SBC wholesale and retail loop products.

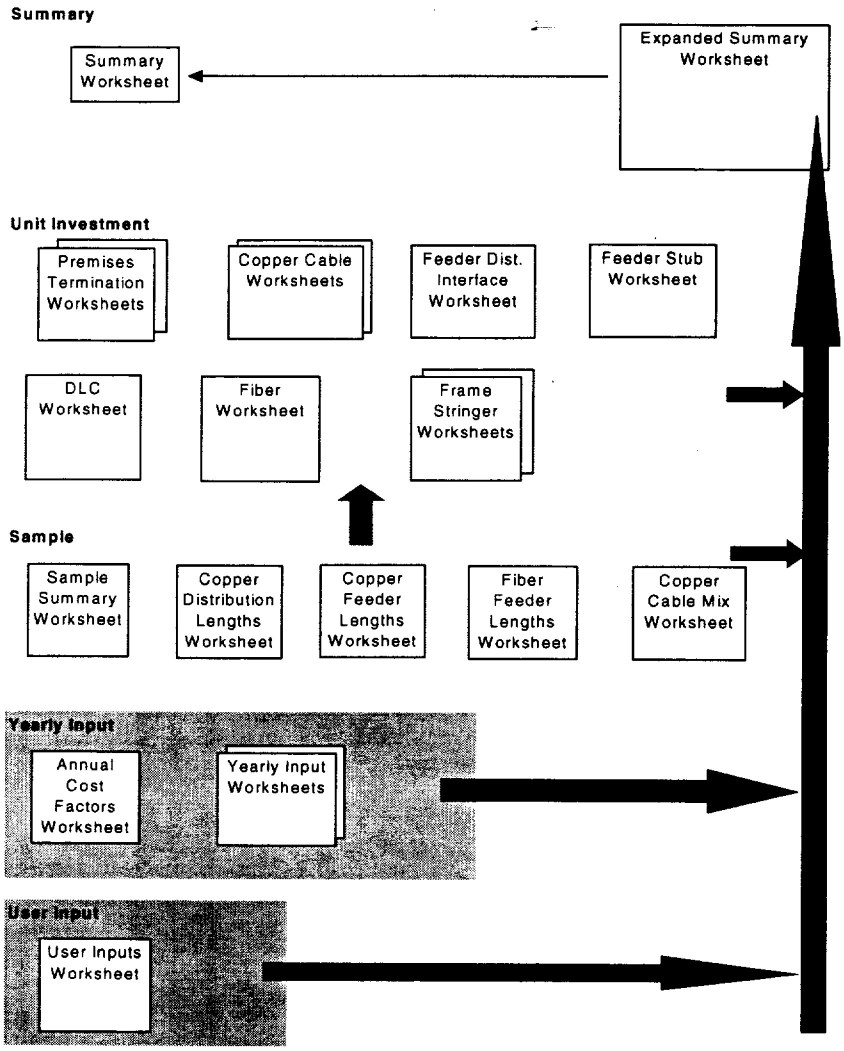
[3] Capital costs include depreciation, cost of money, and income taxes. Operating expenses include maintenance and support assets.

[4] Geographic zones often are defined in terms of groupings of wire centers with similar loop densities. Loop density refers to the number of loops or access lines per square mile of wire center area. A wire center refers to the geographic area served by a local central office.

1.2 SLCS Overview

SLCS is a Microsoft Excel® workbook containing worksheets with inputs, unit investments, and summaries of outputs that reflect the average costs per loop (See Figure 1). The workbook flow can be generalized as going from back to front, meaning input data are entered on the back sheets of the workbook, and the resulting output summaries are presented on the front sheets. The center spreadsheets perform investment and cost calculations based on the sample worksheets and inputs. Input data include material costs, plant inventory, and fill factor information. As mentioned above, the output costs are used in SBC cost studies for wholesale and retail products that require local loops.

Figure 1 - SLCS Excel® Workbook



SLCS input consists of two types of cost data:

> *User Input.* This input section contains both general and specific study information that will be updated prior to generating each SLCS study. General information includes the loop type to be studied, jurisdiction, study area, study

name, and the planning period of the study. Specific information to the study includes utilization, digital loop carrier, main distribution frame, and premises termination related data. Loop samples are extracted from SBC databases and are used in SLCS. Data pertaining to the loop sample for a given state or study area of a state is also included and contains information about copper and fiber feeder, distribution, and feeder stub. The characteristics of the network are also in this section and includes the copper-fiber cross-over point, feeder distribution interface (FDI) connections, maximum resistance for copper feeder and distribution, as well as the weighting of aerial, buried, and underground fiber for the state. The pole and conduit factors, calculated by state, complete this input section.

Yearly Input. Representing the system's core input section, it is typically updated annually or when a change is warranted, such as a change to a loop design due to technological advancement. It includes various loop data and cost information for copper and fiber cabling, cable inventory, digital loop carrier, and feeder distribution interface. It also contains inflation and cost factor information, as well as specific data for premises termination and main distribution frame terminations. See Section 3 for a detailed description of each input.

Unit Investment worksheets calculate investments for each plant component. While the format for each worksheet varies somewhat, their purpose is the same—to develop the plant investment per unit of capacity for each plant component necessary to provide a loop. In developing these unit investments, plant resource costs are used such as cable costs per linear foot, which vary by cable and gauge size. Figure 2 and Figure 3 are examples of the unit investment calculation for fiber and distribution cable.

Figure 2 - Fiber Unit Investment

Fiber Unit Investment

Fiber Cost per Foot

Acc't	Fiber Cost Per Ft.	Innerduct Cost Per Ft.	Contractor Cost Per Ft.	Total Fiber Cost Per Ft.
85C	$6.9800	$0.3000	$2.5000	$9.7800
845C	$13.0000	$0.3000	$1.8500	$15.1500
822C	$8.0000	$0.3000	$0.8000	$9.1000

Fiber Cost per DLC System

Acc't	Total Fiber Cost Per Ft.	Fibers Per Cable	Total Cost Per Fiber Ft.	Fibers Per System	Total Fiber Cable Cost Per System Ft.	DS0 Capacity Per DLC System	Cost Per DS0 System Ft.	Total Number of DS0s Utilized	Fill Factor	Total Cost Per Ckt. Ft.
85C	$9.7800	48	$0.2038	4	$0.8152	2,016	$0.00040	1	62.00%	$0.00065
845C	$15.1500	48	$0.3156	4	$1.2624	2,016	$0.00063	1	62.00%	$0.00102
822C	$9.1000	48	$0.1896	4	$0.7584	2,016	$0.00038	1	62.00%	$0.00061

After unit investments have been determined, they are carried forward in SLCS to the Expanded Summary worksheet. Next, resource quantities (number of premises terminations, distributions cable pair-feet, etc.) per loop are applied to calculate the total plant investments for a loop. Finally, the investments per loop component are multiplied by appropriate annual cost factors and divided by 12 to compute the monthly recurring cost. Figure 4 shows the Expanded Summary worksheet.

Figure 3 - Copper Cable Unit Investment for Distribution Cable

Copper Cable Unit Investment - Buried 19 Gauge

Distribution Cable

Cable Size (Pairs)	Broad Gauge Cost / Foot	Contract Installation Cost / Foot	Installed Cost / Foot	Installed Cost/Pair Foot	Sheath Feet in Service	Distribution Percentage of Sheath by Cable Size	Distribution Sheath Feet	Distribution Pair Feet in Service	Percent of Total	Weighted Installed Cost/Pair Foot
25	$2.0000	$9.0000	$11.0000	$0.4400	19,000,000	100%	19,000,000	475,000,000	23.54%	$0.1036
50	$2.0000	$9.0000	$11.0000	$0.2200	6,500,000	100%	6,500,000	325,000,000	16.11%	$0.0354
100	$4.0000	$9.0000	$13.0000	$0.1300	4,000,000	100%	4,000,000	400,000,000	19.82%	$0.0258
200	$6.0000	$9.0000	$15.0000	$0.0750	2,400,000	100%	2,400,000	480,000,000	23.79%	$0.0178
300	$8.0000	$9.0000	$17.0000	$0.0567	800,000	90%	720,000	216,000,000	10.70%	$0.0061
400	$8.0000	$9.0000	$17.0000	$0.0425	100,000	80%	80,000	32,000,000	1.59%	$0.0007
600	$8.0000	$9.0000	$17.0000	$0.0283	300,000	50%	150,000	90,000,000	4.46%	$0.0013
900	$8.0000	$9.0000	$17.0000	$0.0189	0	40%	0	0	0.00%	$0.0000
1,200	$8.0000	$9.0000	$17.0000	$0.0142	0	20%	0	0	0.00%	$0.0000
1,500	$8.0000	$9.0000	$17.0000	$0.0113	0	10%	0	0	0.00%	$0.0000
1,800	$8.0000	$9.0000	$17.0000	$0.0094	0	0%	0	0	0.00%	$0.0000
2,100	$8.0000	$9.0000	$17.0000	$0.0081	0	0%	0	0	0.00%	$0.0000
2,400	$8.0000	$9.0000	$17.0000	$0.0071	0	0%	0	0	0.00%	$0.0000
2,700	$8.0000	$9.0000	$17.0000	$0.0063	0	0%	0	0	0.00%	$0.0000
3,000	$8.0000	$9.0000	$17.0000	$0.0057	0	0%	0	0	0.00%	$0.0000
3,600	$8.0000	$9.0000	$17.0000	$0.0047	0	0%	0	0	0.00%	$0.0000
4,200	$8.0000	$9.0000	$17.0000	$0.0040	0	0%	0	0	0.00%	$0.0000
Total					33,100,000		32,850,000	2,018,000,000	100%	$0.1907

Average Unit Investments

Item	Installed Cost / Pair Foot	Percent Utilization	Average Cost/Pair Foot
Distribution Cable	$0.1907	44.00%	$0.4334

Figure 4 - Expanded Summary

Expanded Summary

Loop Component	Acc't	Units	Unit Investment	Quantity	Percent Occurrence	Investment Per Loop	Annual Cost Factor	Monthly Cost
Premises Termination								
Residential								
Aerial	622C	Pair	$119.7832	1	11.05%	$13.2360	0.2632	$0.2903
Buried	645C	Pair	$181.1201	1	53.95%	$97.7143	0.2565	$2.0886
Business								
Aerial	622C	Pair	$34.2808	1	5.95%	$2.0397	0.2632	$0.0447
Buried	645C	Pair	$49.4660	1	29.05%	$14.3699	0.2565	$0.3072
Building Entrance Facility	12C	Pair	$0.8667	1	35.00%	$0.3033	0.2252	$0.0057
Subtotal						*$127.6632*		*$2.7365*
Distribution								
Copper								
Aerial Cable	22C							
26 Gauge		Pair-Feet	$0.5320	301	100.00%	$160.1320	0.2632	$3.5122
24 Gauge		Pair-Feet	$0.5884	6	100.00%	$3.5304	0.2632	$0.0774
22 Gauge		Pair-Feet	$0.7032	3	100.00%	$2.1096	0.2632	$0.0463
19 Gauge		Pair-Feet	$0.8757	0	100.00%	$0.0000	0.2632	$0.0000
Buried Cable	45C							
26 Gauge		Pair-Feet	$0.1700	639	100.00%	$108.6300	0.2565	$2.3220
24 Gauge		Pair-Feet	$0.1691	13	100.00%	$2.1983	0.2565	$0.0470
22 Gauge		Pair-Feet	$0.2309	7	100.00%	$1.6163	0.2565	$0.0345
19 Gauge		Pair-Feet	$0.4334	1	100.00%	$0.4334	0.2565	$0.0093
U.G.Cable	5C							
26 Gauge		Pair-Feet	$0.0398	432	100.00%	$17.1936	0.2349	$0.3366
24 Gauge		Pair-Feet	$0.0393	8	100.00%	$0.3144	0.2349	$0.0062
22 Gauge		Pair-Feet	$0.0480	5	100.00%	$0.2400	0.2349	$0.0047
19 Gauge		Pair-Feet	$0.0800	1	100.00%	$0.0800	0.2349	$0.0016
Poles	1C	Factor	-	-	-	$38.1276	0.2143	$0.6809
Conduit	4C	Factor	-	-	-	$11.7665	0.1831	$0.1795
Subtotal						*$346.3721*		*$7.2582*
Feeder Distribution Interface	45C	Connection	$5.7150	3	100.00%	*$17.1458*	0.2565	*$0.3665*
Feeder								
Copper Cable								
Aerial Cable	22C							
26 Gauge		Pair-Feet	$0.1011	165	63.00%	$10.5093	0.2632	$0.2305
24 Gauge		Pair-Feet	$0.1020	1	63.00%	$0.0643	0.2632	$0.0014
22 Gauge		Pair-Feet	$0.1188	0	63.00%	$0.0000	0.2632	$0.0000
19 Gauge		Pair-Feet	$0.1692	0	63.00%	$0.0000	0.2632	$0.0000
Buried Cable	45C							
26 Gauge		Pair-Feet	$0.0297	712	63.00%	$13.3222	0.2565	$0.2848
24 Gauge		Pair-Feet	$0.0326	5	63.00%	$0.1027	0.2565	$0.0022
22 Gauge		Pair-Feet	$0.0428	0	63.00%	$0.0000	0.2565	$0.0000
19 Gauge		Pair-Feet	$0.0525	0	63.00%	$0.0000	0.2565	$0.0000
U.G Cable	5C							
26 Gauge		Pair-Feet	$0.0158	4,825	63.00%	$48.0281	0.2349	$0.9402
24 Gauge		Pair-Feet	$0.0202	37	63.00%	$0.4709	0.2349	$0.0092
22 Gauge		Pair-Feet	$0.0282	0	63.00%	$0.0000	0.2349	$0.0000
19 Gauge		Pair-Feet	$0.0349	0	63.00%	$0.0000	0.2349	$0.0000
Poles	1C	Factor	-	-	-	$2.4319	0.2143	$0.0434
Conduit	4C	Factor	-	-	-	$32.0093	0.1831	$0.4884
Pair Gain								
Feeder Stub	45C	Pair-Feet	$0.0424	848	37.00%	$13.3034	0.2565	$0.2844
Digital Loop Carrier								
C.O. Terminating Equipment	257C	Channel	$114.1590	1	37.00%	$42.2388	0.2530	$0.8905
Remote Terminating Equipment	257C	Channel	$318.1298	1	37.00%	$117.7080	0.2530	$2.4817
Power Equipment	257C	Factor	-	-	-	$7.70	0.2530	$0.1623
Building	10C	Factor	-	-	-	$59.31	0.1916	$0.9470
Land	11C	Factor	-	-	-	$0.73	0.1861	$0.0113
Fiber Cable								
U.G. Cable	85C	Fiber-Feet	$0.0007	11,589	37.00%	$3.0016	0.2004	$0.0501
Buried Cable	845C	Fiber-Feet	$0.0010	3,090	37.00%	$1.1433	0.2037	$0.0194
Aerial Cable	822C	Fiber-Feet	$0.0006	773	37.00%	$0.1716	0.1974	$0.0028
Pole	1C	Factor	-	-	-	$0.0395	0.2143	$0.0007
Conduit	4C	Factor	-	-	-	$1.9811	0.1831	$0.0302
Subtotal						*$354.2668*		*$6.8805*
Main Distribution Frame								
Copper Cable Termination	377C	Pair	$19.0000	1	63.00%	$11.9700	0.2685	$0.2678
DLC Termination	377C	Pair	$4.0161	1	24.66%	$0.9904	0.2685	$0.0222
Building	10C	Factor	-	-	-	$4.5850	0.1916	$0.0732
Land	11C	Factor	-	-	-	$0.0562	0.1861	$0.0009
Subtotal						*$17.6016*		*$0.3641*
Total						*$863.6473*		*$17.6858*

1.3 General Description of SLCS Methodology

SLCS determines the Long Run Incremental Cost (LRIC) to SBC for providing local loop facilities. SLCS does not measure historical or embedded loop costs.

Loop costs reflect the current cost of distribution and feeder cable materials, and engineering and installation, including contractor labor. Digital loop carrier (DLC) system costs reflect the current vendor equipment and technologies being deployed in SBC local exchange carrier local networks, as well as current prices and capacities for the equipment. The costs of the structures and other miscellaneous loop components are included and, again, are based on current materials costs. Therefore, SLCS measures the costs of current and future loop plant costs suitable for LRIC and Total Element Long Run Incremental Cost (TELRIC) studies.

Unit investments reflect either engineering fill or actual fill. SLCS allows the user to specify the fill factor used in calculating per-unit costs. One option is to use engineering fills, which represent the utilization level at which additional plant capacity must be added. Engineering fills vary depending upon the loop component. For example, the engineering fill for copper feeder cables typically is 85%, whereas for certain plug-in equipment on DLC systems, engineering fill may reach as high as 90%. When loop costs are measured with engineering fills, an incremental loop cost is computed. This value is appropriate for LRIC studies used to measure "price floors" for retail services requiring local loops.

The other option is to use current or forward-looking actual fill. This is the ratio of plant capacity in service to total plant capacity. Using this value in SLCS results in the cost of spare capacity being attributed to the loop cost. This option is appropriate for TELRIC studies used to establish prices for unbundled loops. Actual utilization levels vary by loop component.

Section 2.2 provides additional background on the costing concepts underlying these methods.

2.0 Telecommunication Networks and Loop Costs

This section provides a basic understanding of the public telecommunications network and the function and typical design of the local loop. It also provides information on local loop investments and cost drivers.

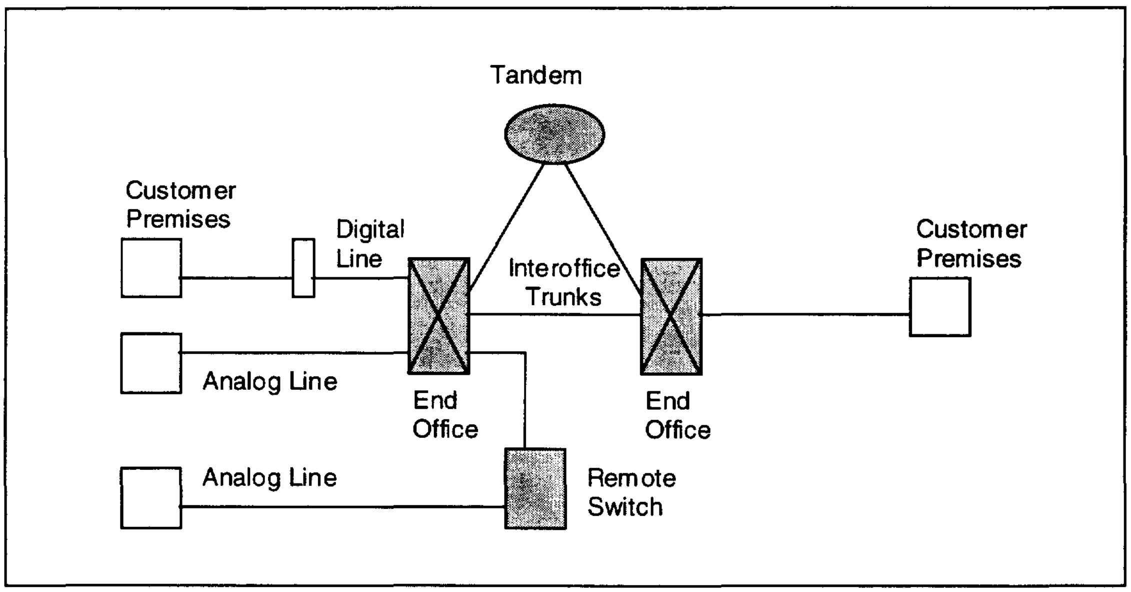
2.1 Telecommunications Networks

This section will describe a telecommunication network in general terms and then will identify and define the major portions of the local loop.

2.1.1 General Telecommunications Network Overview

Figure 5 is a simplified diagram of the public telecommunications network.

Figure 5 - Network Overview



Telephone equipment at a customer's premises is connected to copper cables, which provide a communications path from the telephone equipment to a local telephone company end office (central office). The communications path may be over a pair of copper wires running from the customer's premises to the central office, or the copper pair may terminate at an intermediate terminal (remote terminal) where a digital communications channel is provided using electronic equipment and fiber cables to the central office. This is the local loop.

At the central office, the copper cable pair is connected to line equipment on the central office switch. The line equipment provides direct current to the customer's telephone line, detects when the customer goes "off hook" to make a call, provides dial-tone and performs other functions. Line equipment typically is dedicated to each customer line,

and is often referred to as non-traffic sensitive plant, since the amount of customer line use does not affect the amount of line equipment required.
If the customer is provided access to the central office via a digital line, the digital transmission may be converted back to an analog signal, or the digital channels may be directly terminated on the switch. Copper access lines and digital lines reconverted to analog signals are referred to as analog lines, whereas digital channels terminating directly on the switch are digital lines.

When a customer makes a phone call, the central office switch performs several functions. It receives digits of the telephone number being called, communicates with the signaling network to establish the call, and provides a call path through the switch to another telephone line or to an interoffice trunk (if the called party is served by another central office). The capacity requirements for switch equipment providing these functions is sensitive to the number of call attempts and call duration during the peak period of use.

Customer lines also may terminate on remote switches located closer to customers than central offices. Remote terminals perform some central office functions. They are connected to a host—central offices via trunks.

Tandem switches are used to connect interoffice trunks transporting traffic among central offices and between the SBC network and those of other carriers.

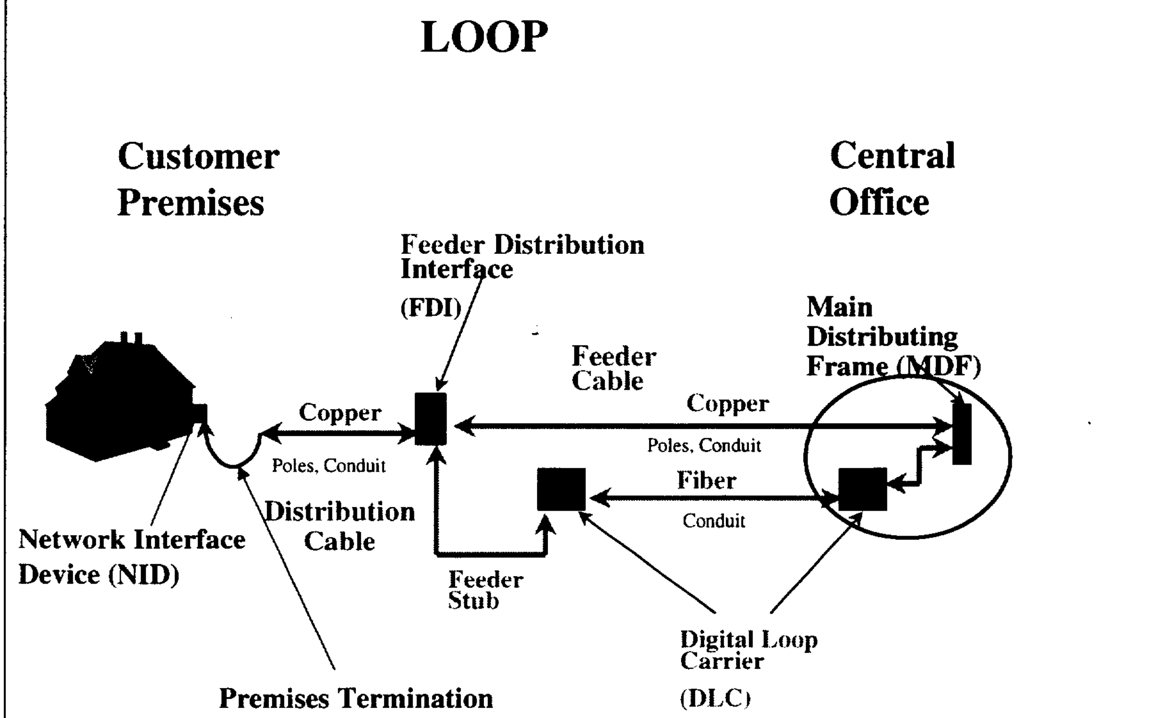
2.1.2 Local Loop in Telecommunications Network

Figure 6 illustrates the design of a typical local loop.

The local loop can be broken into six primary parts.

> *Premises Termination.* The combination of the network interface device (NID), the drop cable, and the terminal (the point of connection to the distribution cable) is referred to as premise termination equipment in the Loop Costing System. They provide the transmission path from the terminal located near the customer's premises in the outside plant network to the customer's premises.
>
> *Distribution Cable.* This is the copper cable that runs from the feeder-distribution interface to the terminal located near the customer's premises. The cable is generally placed on private property in a utility easement and, as such, is sized in order to minimize the disruption that results from placement of additional facilities. Distribution cable is often smaller in size and capacity relative to feeder cables.
>
> *Feeder-Distribution Interface (FDI).* It is at this point that the "cross-connection" between the feeder plant from the serving central office and the distribution plant takes place.

Figure 6 - Local Loop



Feeder Plant. The feeder portion of the local loop runs from the serving central office to the feeder-distribution interface. Feeder plant can be comprised of either copper cables or digital loop carrier (DLC) systems using fiber cables. These facilities are usually located on public rights of way and are sized to provide capacity for a specified engineering period of time. These cables are generally large in size and capacity, relative to distribution cable.

Feeder Stub and Pair Gain System. When loop feeder cable lengths exceed a certain threshold, fiber feeder cable and digital loop carrier systems are used. A copper feeder stub is required to connect the FDI and the DLC equipment. In addition, DLC systems require circuit equipment located in the field and usually in the central office. DLC equipment provides multiplexing of voice channels over the fiber cable between the central office and the feeder-distribution interface.

Frame Stringer. Frame stringer, also referred to as Main Distribution Frame equipment, connects outside plant cables to the Main Distribution Frame. One important role of the frame stringer is to protect personnel and sensitive electronic equipment from external electrical power such as lightning. It does this by using protector units and connector blocks.

2.2 Loop Costs

Local loops are one of several types of telephone plant. Others include switching, cable and wire facilities, transmission equipment, etc. According to the Federal Communications Commission's Uniform System of Accounts, telephone plant investments include all costs of constructing plant – vendor materials and supplies, telco labor and engineering costs, transportation, taxes, etc.[5]

SLCS draws plant cost information from several special studies, computes unit investments for the loop components, and then determines recurring monthly costs for each components and the loop as a whole. Plant investments are computed for the study areas based on loop characteristics in each area. These characteristics include:

> *Loop Length.* Samples of actual loops in service are used to determine average loop lengths. These average lengths are usually separated into study areas so that the study results will truly represent the characteristics of the study area.
>
> *Mix of cable types.* Different proportions of aerial, buried, and underground cable are used in rural, mid-sized or suburban, and urban wire centers. They are based on a study of the actual cable types in service in each study area.
>
> *Installed cable costs per pair-foot* by cable type and wire gauge (26, 24, 22, and 19 gauge). Installed cable costs vary depending on the size of cable (in terms of the number of pairs per cable), on the gauge of copper wire used, and on the plant type (aerial, buried, or underground). Calculations are made to determine the mix of cable sizes, and based on this mix, installed cable costs per pair-foot are determined for each combination of cable type and wire gauge.
>
> *Fill Factors.* Telephone plant is provisioned with adequate capacity to serve immediate needs and to provide capacity for growth. At some point, capacity is effectively exhausted, and additional capacity must be placed. The difference between plant capacity and in-service demand represents spare capacity. SLCS expresses capacity utilization in terms of fill factors. Generally speaking, SLCS will use either actual fill rate values or engineering fill rates depending on the study's purpose.
>
> *Digital Loop Carrier (DLC).* When feeder cable lengths exceed a certain threshold, SLCS assumes that DLC systems are in place. DLC systems consist of digital electronic circuit equipment that enables many voice channels to be combined over a single fiber. This is accomplished by using "time-division multiplexing." The result is lower costs and better transmission quality than traditional copper cables for loops with long feeder cable lengths.

[5] See FCC Part 32.1500 (c) for a description of telephone plant construction costs.